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WASHINGTON LETTER.

WASHINGTON, September 15, 1889.

The office of Superintendent of the United States Coast and Geodetic Survey, has been held for seventy-three years by men of great eminence. Here is the record :

Ferdinand Rudolph Hassler, 1816-1843.
Alexander Dallas Bache, 1843-1867.
Benjamin Peirce, 1867-1874.
Carlisle Pollok Patterson, 1874-1881.
Julius Erasmus Hilgard, 1881-1885.
Frank M. Thorn, 1885-1889.
Thomas Corwin Mendenhall, 1889.

It is one of the most distinguished scientific appointments in the country, and the recent selection of Prof. Mendenhall is considered an eminently proper one.

Born in Ohio, in 1841, Mr. Mendenhall was elected in 1873 professor of physics and mechanics in the Ohio State University. In 1878 he accepted the professorship of physics in the University of Japan, but resumed his chair in the Ohio State University in 1881, and in the following year organized the Ohio State Weather Service of which he was Director until 1884. In that year he was appointed professor in the United States Signal Service at Washington, where he remained until 1886, when he accepted the presidency of the Rose

Polytechnic Institute at Terre Haute, Indiana. In 1889 he was President of the American Association for the Advancement of Science. His printed contributions to science are numerous. He carries the degree of Ph. D. from the Ohio State University, and that of LL.D. from the University of Michigan.

There is a large amount of geographic information contained in the 136 quarto pages of the Report on the Sounds and Estuaries of North Carolina with reference to oyster culture, by Francis Winslow, U. S. Navy.* For the first time we have a description in detail of the outlying region and intricate coast of North Carolina. The areas, depths and lengths of the twelve sounds and numerous bays, rivers, inlets and creeks are minutely stated. It was in consideration of hydrographic data to be incidentally added to the archives of the Coast Survey, and for other reasons that a party was placed under the command of Lieut. Winslow in 1886, to aid in the development and definition of areas adapted to the cultivation of oysters in the sounds and estuaries of North Carolina. In the report above referred to, which has been recently issued, the character of the work and the results attained are stated. Within the brief period of less than three years nearly 600,000 acres of cultivable surface, capable of producing annually perhaps twice or thrice the product of the Maryland oyster beds in 1880 have been developed ; fully 50,000 acres of which have already been taken up. The continued increase in the demand for oysters all over the country, and the continued diminution in the supply from the oyster-growing localities show that an increase of the productive area is

* U. S. Coast and Geodetic Survey : Bulletin No. 10.

not only desirable, but will prove a benefit to the people of the country at large. As Lieut. Winslow observes : " The ultimate results cannot be foreseen. But it is not unreasonable to predict that the few hundreds of dollars (\$1,786) expended on the investigation of Pamlico Sound and its tributaries will be the means, in the not distant future, of establishing an industry worth hundreds of thousands of dollars, employing many thousands of people, supporting many thousands more, and largely increasing the present supply of marketable oysters."

When Prof. J. Howard Gore of Columbian University began in 1885 a History of Geodesy, he found it very difficult at any time to be sure that the literature regarding the operations of a given period had been exhausted. So he deemed it best to collect titles as well as the works themselves. The various libraries in America were searched, and during two trips to Europe nearly every facility there was exhausted. Catalogues of libraries, however small, bibliographies of exact sciences, biographies of mathematicians, and trade lists of antiquarian books were carefully examined. In addition, a circular letter with an appended list of all his known works was sent to every living mathematician whose address could be obtained. The most notable accessions thereby secured were contributed by Col. John Herschel, R. E., who sent a manuscript supplement to his contribution to pendulum bibliography which was published in "Operations of the Great Trigonometrical Survey of India," Vol. V. This manuscript was found to contain seventy-two new titles.

The results of Prof. Gore's researches are embodied

in *A Bibliography of Geodesy*, a quarto volume of 200 pages, double columns ; being Appendix No. 16 of the Report of the United States Coast and Geodetic Survey for 1887, just issued from the press. When it is announced that this work contains approximately 7,000 titles, it need not be added that it is a most notable bibliography. The author disclaims adherence to "all the refinements of bibliographic science," but nevertheless the work has been exceedingly well done. The insertion after the title of each work, of the name of the owner, or the depository where found is a feature that will be appreciated by those who have occasion to consult its pages. The claim made by Mr. Thorn in the Introduction that it is "the first work of its kind" will hardly stand. Prof. Gore himself cites other titles in his *Bibliography*.

It may be added that various overtures were made by foreign institutions desiring to publish this bibliography, but Prof. Gore having proffered the manuscript to the Coast Survey as the recognized American bureau of geodesy, the Superintendent gladly availed himself of the privilege of its preservation and publication.

CONGRESS OF THE THREE AMERICAS.—The gathering of the representatives of American nations at Washington on the 2d of October is an event of far reaching importance. Invitations have been sent to all the governments south of the United States, in pursuance of an Act of Congress approved May 24, 1888, by the terms of which the President is "requested and authorized to invite the several Governments of the Republics of Mexico, Central and South America, Hayti, San Domingo, and the Empire of Brazil to join the United

States in a conference to be held at Washington, in the United States, at such time as he may deem proper, in the year eighteen hundred and eighty-nine, for the purpose of discussing and recommending for adoption to their respective Governments some plan of arbitration for the settlement of disagreements and disputes that may hereafter arise between them, and for considering questions relating to the improvement of business intercourse and means of direct communication between said countries, and to encourage such reciprocal commercial relations as will be beneficial to all and secure more extensive markets for the products of each of said countries."

It is also provided in the act referred to that, in forwarding the invitations to the said governments, the President of the United States shall set forth that the conference is called to consider :

First. Measures that shall tend to preserve the peace and promote the prosperity of the several American States.

Second. Measures toward the formation of an American customs union, under which the trade of the American nations with each other shall, so far as possible and profitable, be promoted.

Third. The establishment of regular and frequent communication between the ports of the several American States and the ports of each other.

Fourth. The establishment of a uniform system of customs regulations in each of the independent American States to govern the mode of importation and exportation of merchandise and port dues and charges, a uniform method of determining the classification and valuation of such merchandise in the ports of each coun-

try, and a uniform system of invoices, and the subject of the sanitation of ships and quarantine.

Fifth. The adoption of a uniform system of weights and measures, and laws to protect the patent rights, copyrights, and trade-marks of citizens of either country in the other, and for the extradition of criminals.

Sixth. The adoption of a common silver coin, to be issued by each Government, the same to be legal-tender in all commercial transactions between the citizens of all of the American States.

Seventh. An agreement upon and recommendation for adoption to their respective Governments of a definite plan of arbitration of all questions, disputes, and differences that may now or hereafter exist between them, to the end that all difficulties and disputes between such Nations may be peaceably settled and wars prevented.

Eighth. And to consider such other subjects relating to the welfare of the several States represented as may be presented by any of said States which are hereby invited to participate in said conference.

In the letter sent out to the diplomatic representatives of this country in the countries named, the Secretary of State says : " I have to call your particular attention to the scope and object of the conference suggested, which, as will be observed, is consultative and recommendatory only. The proposed conference will be wholly without power to bind any of the parties thereto, and it is not designed to affect or impair in any degree the treaty relations now existing between any of the States who may be represented. The topics for discussion and deliberation are manifestly of profound importance, and it is believed that a friendly and frank exchange of views in re-

lation to these subjects will be of practical use, and by mutual enlightenment will materially promote that expansion and intimacy of social and commercial relations which must be fruitful of blessings to all concerned.

“Certain topics are suggested as proper subjects for a comparison of views, but the field is expressly left open to any participant State to bring before the conference such other subjects as may appear important to the welfare of the several States represented.

“By direction, therefore, of the President of the United States, and in his name, you will tender to the Government of —— a cordial invitation to be represented by such number of delegates as may seem to it convenient, at the international conference to be convened as aforesaid in the city of Washington, on Wednesday, the 2d day of October, 1889, it being understood however that in the disposition of questions to come before such conference, no State shall be entitled to more than one vote, whatever be the number of delegates it may send.”

Letters of acceptance have been received from the Governments of the Argentine Republic, Bolivia, Brazil, Chili, Columbia, Costa Rica, Equador, Guatemala, Hayti, Honduras, Mexico, Nicaragua, Paraguay, Peru, Salvador, Uruguay and Venezuela.

The Government of Santo Domingo declines to send delegates. The delegates to the conference on the part of the United States are John B. Henderson of Missouri; Cornelius N. Bliss of New York; Clement Studebaker of Indiana; T. Jefferson Coolidge of Massachusetts; William Henry Trescott of South Carolina; Andrew Carnegie of Pennsylvania; Morris M. Estee

of California; John F. Hanson of Georgia; Charles R. Flint of New York; and Henry G. Davis of West Virginia.

The proceedings of the conference will be mainly in the English and Spanish languages, although if the rule of similar bodies is followed, the representative of any government will make his motions and propositions in his native language on the theory that he can thereby better express the finer shades of meaning than in an unfamiliar tongue. Then translations will be made into English. The proceedings are to be printed by the Public Printer in the English, Spanish and Portuguese languages. This will provide for every body concerned except Hayti, whose language is French.

The second proposition, although surrounded by almost insuperable difficulties, is probably the most important. The tariffs in each country are varying and conflicting, so that possibly the only way of surmounting the numerous obstacles presented will be by negotiating reciprocity treaties, whereby products peculiar to one country may be admitted free into the others.

The adoption of silver coin to be a common legal tender (sixth proposition) is not regarded as of vital importance. If the markets for our products in South American countries, and the markets for South American products in the United States are opened, commercial transactions will be so enlarged that New York will take the place of London in the settlement of balances in our currency without the aid of a common coin.

Mr. Charles A. Flint has recently made some statements* as to the commercial condition of the countries

*Address before the Merchants' Club of Boston.

south of us, which aid considerably in estimating the importance of successful results from the proposed conference. 1. The population is about 50,000,000. 2. The aggregate foreign trade for 1888 valued in United States gold coin was about \$1,200,000,000, of which our share was \$240,000,000. 3. We bought of them \$181,000,000, and sold to them \$69,000,000. 4. During the past twenty years our purchases from those countries have increased \$78,000,000, and our sales only \$12,000,000.

Before entering upon the discussions of the convention it has been wisely concluded to familiarize the delegates with the country by a personal inspection of our commercial and manufacturing centres. To this end they will leave Washington on the day following the opening for an extended tour through the eastern, northern, and western States, which will probably consume the time till November 14. The tour through the Southern States will be deferred until later in the season when the winter hotels are open. It is expected that the entertainment of the guests at points of debarkation will be provided by the localities favored. Numerous requests have been received at the Department of State, accompanied by liberal proffers from municipalities, boards of trade, manufacturers and others. No limit of time has yet been indicated, but it is probable that the congress will remain in session several months.

INTERNATIONAL MARINE CONFERENCE. — Under the provisions of "An act providing for an international marine conference to secure greater safety for life and property at sea," approved July 9, 1888, the President

of the United States was authorized to invite the government of each maritime nation to send delegates to a maritime conference, and to appoint seven delegates on the part of the United States.

These preliminary requirements have been complied with, and the following countries have thus far accepted invitations to participate: Great Britain, Germany, France, Italy, Denmark, Russia, Belgium, Mexico, Brazil, Chili, Costa Rica, Guatemala, Venezuela, Hawaii, China, Japan, The Netherlands, Nicaragua, Spain, Sweden and Norway, Uruguay and Honduras. The United States will be represented by a board of seven persons, and it is expected that the larger Powers will have the same number of representatives. The smaller countries, it is thought, will generally be represented by their Ministers here, assisted by one or more experts in the subjects before the conference. The American delegates are Rear Admiral S. R. Franklin; W. P. Sampson, Commander U. S. Navy; S. I. Kimball, Superintendent Life Saving Service; James W. Norcross, Master Mariner; John W. Shackford, Master Merchant Marine; William W. Goodrich, Counsellor-at-Law, and C. A. Griscom, President International Navigation Company.

The conference is to meet in Washington on the 16th of October.

It is declared in the act: "That it shall be the object of said marine conference to revise and amend the rules, regulations and practices concerning vessels at sea, and navigation generally, and the International Code of Flag and Night Signals; to adopt a uniform system of marine signals, or other means of plainly in-

dicating the direction in which vessels are moving in fog, mist, falling snow, and thick weather, and at night ; to compare and discuss the various systems employed for the saving of life and property from shipwreck ; for reporting, marking and removing dangerous wrecks or obstructions to navigation ; for conveying to mariners and persons interested in shipping, warnings of approaching storms, of dangers to navigation, of changes in lights, buoys, and other day and night marks, and other important information ; and to formulate and submit for ratification to the governments of all maritime nations proper international regulations for the prevention of collision and other avoidable marine disasters.

The American delegates (with the exception of Mr. Griscom) convened under instructions from the Secretary of State, and in April last formulated a detailed programme of subjects to be considered, for transmission to the several Powers. The following is the order :

General Division 1. Marine signals or other means of plainly indicating the direction in which vessels are moving in fog, mist, falling snow and thick weather, and at night. Rules for the prevention of collisions and rules of the road.

1. Visibility, number, and position of lights to be carried by vessels : (a) Steamers under way. (b) Steamers towing. (c) Vessels under way, but not under command, including steamers laying cable. (d) Sailing vessels under way. (e) Sailing vessels towing. (f) Vessels at anchor. (g) Pilot vessels. (h) Fishing vessels.

2. Sound signals ; their character, number, range, and position of instruments : (a) For use in fog, mist, falling

snow, and thick weather ; as position signals for steamers under way ; for steamers towing ; for sailing vessels under way ; for sailing vessels towing ; for vessels at anchor ; for vessels under way but not under command, including steamers laying cable. (b) For use in all weathers as helm signals only ; for steamers meeting or crossing ; for steamers overtaking ; for steamers backing. (c) Whether helm signals shall be made compulsory or remain optional.

3. Steering and sailing rules : (a) Sailing vessels meeting, crossing, overtaking, or being overtaken by each other. (b) Steamers meeting, crossing, overtaking, or being overtaken by each other. (c) Sailing vessels meeting, crossing, overtaking, or being overtaken by steamers. (d) Steamers meeting, crossing, overtaking, or being overtaken by sailing vessels. (e) Special rules for channels and tide-ways, where no local rules exist. (f) Conflict of international and local rules. (g) Uniform system of commands to the helm. (h) Speed of vessels in thick weather.

General Division 2. Regulations to determine the sea-worthiness of vessels. (a) Construction of vessels. (b) Equipment of vessels. (c) Discipline of crew. (d) Sufficiency of crew. (e) Inspection of vessels. (f) Uniform certificates of inspection.

General Division 3. Draft to which vessels should be restricted when loaded. Uniform maximum load mark.

General Division 4. Uniform regulations regarding the designating and marking of vessels. (a) Position of name on vessel. (b) Position of name of port of registry on vessels. (c) Size of lettering. (d) Uniform system of draft marks.

General Division 5. Saving life and property from shipwreck. 1. Saving of life and property from shipwreck at sea. (a) Duties of vessels after collision. (b) Apparatus for life saving to be carried on board ship. (c) The use of oil and the necessary apparatus for its use. (d) Uniform inspections as to b and c. 2. Saving of life and property from shipwreck by operations from shore. (a) Organization of, and methods employed, by life-saving institutions. (b) The employment of drilled and disciplined crews at life-saving stations. (c) The maintenance of a patrol upon dangerous coasts by night, and during thick weather by day, for warning off vessels standing into danger, and for the early discovery of wrecks. (d) Uniform means of transmitting information between stranded vessels and the shore. (e) Life-boats, life-saving apparatus and appliances. 3. Official inquiries into causes and circumstances of shipwrecks and other casualties.

General Division 6. Necessary qualifications for officers and seamen, including tests for sight and color blindness. (a) A uniform system of examination for the different grades. (b) Uniform tests for visual power and color blindness. (c) General knowledge of methods employed at life-saving stations. (d) Uniform certificates of qualification.

General Division 7. Lanes for steamers on frequented routes. (a) With regard to the avoidance of steamer collisions. (b) With regard to the safety of fishermen.

General Division 8. Night signals for communicating information at sea. (a) A code to be used in connection with the International Code Signal book. (b) Or a supplementary code of limited scope to convey infor-

mation of special importance to passing vessels. (c) Distress signals.

General Division 9. Warning of approaching storms. (a) The transmission of warnings. (b) The uniformity of signals employed.

General Division 10. Reporting, marking, and removing wrecks or obstructions to navigation. (a) A uniform method of reporting and marking dangerous wrecks and derelicts. (b) The division of labor, cost, and responsibility among the several maritime nations, either by geographical apportionment or otherwise, of the removal of dangerous derelicts, and of searching for doubtful dangers with a view of removing them from the charts.

General Division 11. Notice of dangers to navigation. Notice of changes in lights, buoys, and other day and night marks. (a) A uniform method of taking bearings, of designating them (whether true or magnetic), and of reporting them. (b) A uniform method of reporting, indicating, and exchanging information by the several maritime nations—to include the form of notices to mariners. (c) A uniform method of distributing this information.

General Division 12. A uniform system of buoys and beacons. (a) Uniformity in color of buoys. (b) Uniformity in numbering of buoys.

General Division 13. The establishment of a permanent international maritime commission. (a) The composition of the commission. (b) Its powers and authority.

The board has sent out letters to many sources, asking for information on the subjects to be considered, and

bundles of it have been received from the Light-house Board and the Chief Signal officer of the army.

The proceedings of the conference will be in the English language, but representatives will make their motions and propositions in their own language.

The programme proposed is not binding upon the conference, but probably will be adopted. The act authorizing the conference expressly forbids the consideration of commercial matters.

The following named nations have declined to participate in the proceedings of the conference: Greece, Roumania, Liberia, Peru, Paraguay and Colombia.

The claim is made, and probably not contested, that the Maritime Exchange, of New York, has the honor of originating this remarkable conference. It formulated the bill and urged its passage in Congress, and furthermore, when Great Britain at first declined to come into the conference, brought about a compromise on certain points, so that Great Britain consented to send delegates.

GREAT CIRCLE SAILING.—The actual state of the science of great circle sailing is presented in a recent publication of the U. S. Hydrographic office.* It consists of an exposition of graphical and analytical methods embodying cardinal principles relating to the great circle, as applied to navigation, and gives publicity for the first time to several of the most convenient and useful methods yet devised. The work is regarded as of high importance.

*The development of great circle sailing, by G. W. Littlehales. Under direction of G. L. Dyer, Lieut., U. S. N., Washington, 1889.

HOPE BANK AND RUM CAY.—Capt. Z. L. Tanner in his report of the work of the U. S. Fish Commission Steamer *Albatross* for 1886, just published, gives a narrative of his search for the supposed Hope Bank, which has occupied a position on Admiralty Charts in latitude $41^{\circ} 29' 28''$ N., and longitude $63^{\circ} 17'$ W. The cruise was made at the suggestion of Commander J. R. Bartlett, late Hydrographer, U. S. N., "for the purpose of determining the existence, and if possible the character of certain banks which are believed by some to exist, but which so far have not been properly examined."

The first soundings began at latitude $40^{\circ} 14'$ N., longitude $65^{\circ} 56'$ W., in 2,224 fathoms. The line was carried to the eastward to latitude $40^{\circ} 20'$ N., longitude $64^{\circ} 54'$ W., in 2,575 fathoms, thence to the position assigned to Hope Bank, where eleven soundings were taken at intervals of five miles, the depths varying from 1,930 to 2,069 fathoms. At the position assigned to the Bank there was found a depth of 1,969 fathoms! The *Albatross* then proceeded to St. Johns, Newfoundland, and on the return voyage additional soundings were taken in depths varying from 1,644 to 1,943 fathoms to the northward of those taken on the outward trip, demonstrating beyond a doubt that no shoal or bank exists on the ground covered. Subsequently a line of soundings was run to the westward to George's Bank, without finding any indications of shoal water to the eastward of it.

Capt. Tanner assigns the following reasons for the hitherto supposed existence of the bank: "Reference to the chart (H. O. Chart 21a) will show its assigned position to be near the northern edge of the Gulf Stream,

where its deep blue waters with temperatures above the normal and high specific gravity, impinge upon the colder green water of the Arctic current. The first sight of this green water on emerging from the Gulf Stream gives one the impression that he has suddenly struck soundings. The bank once placed on the chart, the navigator who found himself in green water anywhere in that region during foggy weather, or when from any cause he was uncertain of his position, would conclude at once that he was in shoal water, and locate himself in the position assigned to Hope Bank. The difference in color and specific gravity between the waters of the Gulf Stream and the region adjacent varies with the seasons, and is more marked during summer and autumn when the fresh water from melting ice finds its way from the Arctic. The navigator passing over the region had neither time nor the means at hand for satisfactory investigation; therefore, he was forced to judge from appearances, which, we have shown, are deceptive."

In this same report will be found a sketch of Rum Cay, one of the Bahama group, probably identical with Santa Maria de la Concepcion, the second island touched at by Columbus, by Lieut. Commander James M. Forsyth, U. S. N., a native of the island. It is replete with interesting facts and reminiscences.

IRRIGATION.—Aside from the monthly reports of surveying parties scattered in various parts of the west, southwest and on the Pacific slope, there is nothing new in the matter of the irrigation of arid lands. A committee of the United States Senate, accompanied by Major Powell, is engaged in an extensive tour over

a large part of the western territory, and the newspapers of that region are loaded with irrigation literature. The last appropriation of a quarter of a million dollars has been apportioned between the topographic survey (\$120,000), the hydrographic survey (\$32,000), and the engineer survey (\$76,000). Capt. Clarence E. Dutton, U. S. A., is in charge of the engineering and hydrographic surveys, and Prof. Almon H. Thompson has charge of the topographic survey. That irrigation is now a matter of serious concern and that large sums of money will be expended upon it—and probably wisely—there cannot be a shadow of doubt. But more will be known about it after the next Congress convenes. Meanwhile surveys and maps are being made, gauging stations established, and lakes scheduled preparatory to their selection and withdrawal for use as reservoir sites.

The latitudes and longitudes of certain localities in Missouri, Kansas and New Mexico were determined in 1885–86 in connection with the geographic work of the Geological Survey. The names of these localities are Oswego, Elk Falls, and Fort Scott, in Kansas; Springfield and Bolivar, in Missouri; and Albuquerque in New Mexico. Mr. Robert S. Woodward has collected and discussed the results of this work in a recent Bulletin* of the U. S. Geological Survey. The same writer has contributed to the Survey a series of mathematical formulas and tables designed to facilitate the construction and use of maps.† In this connection may be mentioned Mr. Schott's report on heights from geodesic leveling between Mobile and New Orleans, being Appendix No. 9 of the

*Bulletin No. 49.

†Bulletin No. 50.

Report of the United States Coast and Geodetic Survey for 1887, just issued. Other Appendices of this Report are: Fluctuations in the level of Lake Champlain and mean height of its surface above the sea; and the magnetic work of the Greely Arctic expedition; both by Mr. Schott; and Mr. Henry Mitchell's discussion of the movements of sands at the eastern entrance of Vineyard Sound.

THE ECLIPSE, 1889.—The United States Government will send an expedition to the west coast of Africa to observe the solar eclipse to occur December 21–22. The Navy Department has appointed a commission composed of Capt. R. L. Phythian, superintendent of the Naval Observatory, Simon Newcomb and Asaph Hall to devise a plan and make recommendations. The first step taken by this commission was to communicate with the United States consular officers on the coast of Africa to ascertain the usual conditions of the weather in December. This information is important in determining the location of observing stations. It is preferred to have the stations on the coast, but if the conditions there are unfavorable for observing, the parties may be sent inland. An examination of the path or belt of the eclipse as charted in the Nautical Almanac shows that the Guinea coast is about the only place where an expedition could be sent with fair promise of success. The belt within which the eclipse will be total extends across the continent of Africa, and passing over the Atlantic Ocean just grazes the northeast coast of South America. There is an island off the coast of French Guiana almost in the centre of the belt, but the eclipse occurs there a

little after sunrise, when the conditions for observing will be unfavorable. The period of totality there is only about two minutes. On the Guinea coast the eclipse occurs between 12 and 3 o'clock.

AN AFRICAN DISCOVERY.—Mr. Daniel F. Rankin, a private explorer, has made a very important discovery of a new opening in the Zambesi delta, connecting direct with the main stream of the Zambesi proper. The new opening is called the Chinge River, and is situated 45 miles south of the Quaqua River, on which Quillimane now stands. On the bar itself of the Chinge River at the lowest fall of the spring tides, there is a good three fathoms of water, with a channel some 500 yards wide and with good anchorage under shelter of the land. Mr. Ernest W. Smith, consul at Mozambique says: Hitherto commerce has been restricted and confined because of the difficulties attending the present route from the coast to the Zambesi, both at Quillimane and Inhemissengo, and it has been long felt that such a discovery was of the greatest necessity and importance to the development of the vast and rich regions drained by this waterway, and also of the greatest importance to the whole districts surrounding Lake Nyassa. At the present time all goods for the Zambesi River have to be brought up the Quaqua River (where there is only two and a half fathoms of water) to be landed at Quillimane for inspection at the custom house. From Quillimane the goods are shipped in lighters or canoes up the Quaqua River to a place called Mopea, four-and-a-half days' journey from Quillimane. At Mopea the goods are again unloaded and are

carried by natives for six miles through a swamp of two feet of water, to the Zambesi River, and from Senna or Tete, on the Zambesi, steamers connect with all points of importance in the lake districts.

By the new opening discovered by Mr. Rankin, vessels of from 500 to 600 tons burden can go direct from the sea to the Zambesi and thence to the Lake Nyassa districts without any change and with none of the bother now existing in connection with tides and seasons of the year.

The governor of the province, after having verified Mr. Rankin's discovery, requested the Portuguese home authorities to remove the seat of government of Quillimane from its present place on the Quaqua River, to the mouth of the Chinge River, and to order that henceforth all mail steamers call at the latter place instead of, as heretofore, at the former.

H.